Building Effective Partnerships for Urban Air Quality Management in Asia

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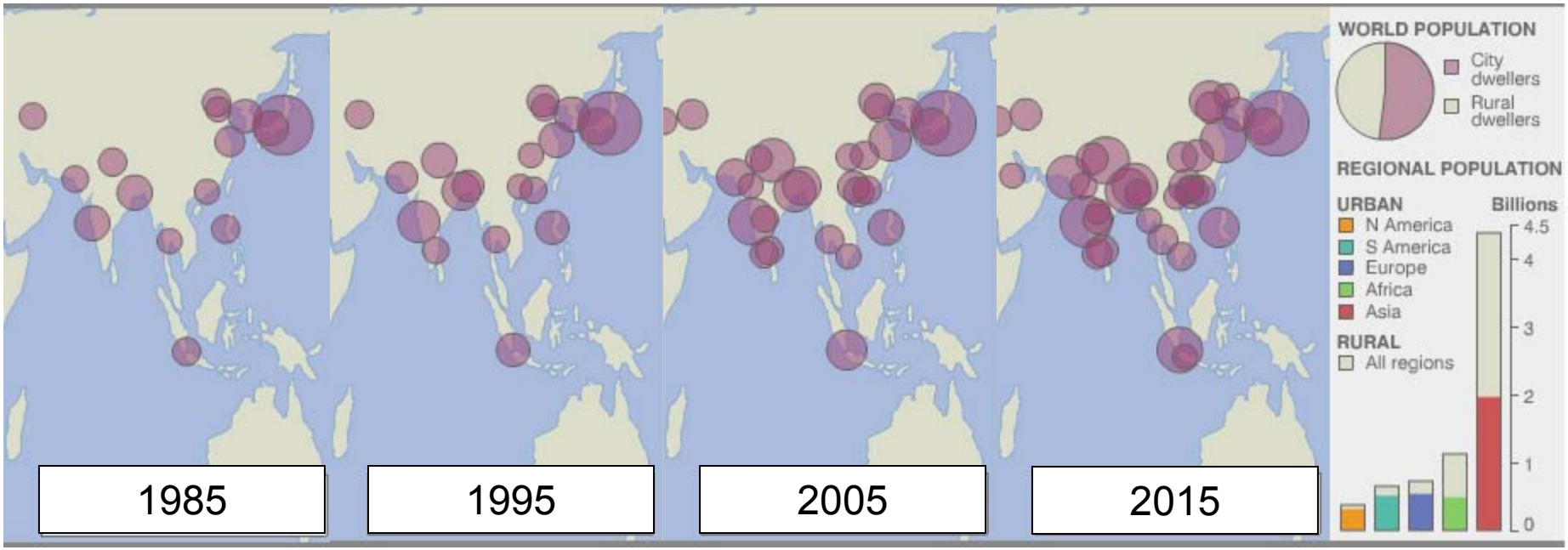
Outline

- Urban Air Quality in Asia:
  - Drivers
  - Pressure
  - State
  - Impact
  - Response
- What or who is CAI-Asia?
- Short history of the organization and key outputs

Part 1: Urban Air Quality in Asia

Drivers: Urbanization in Asia

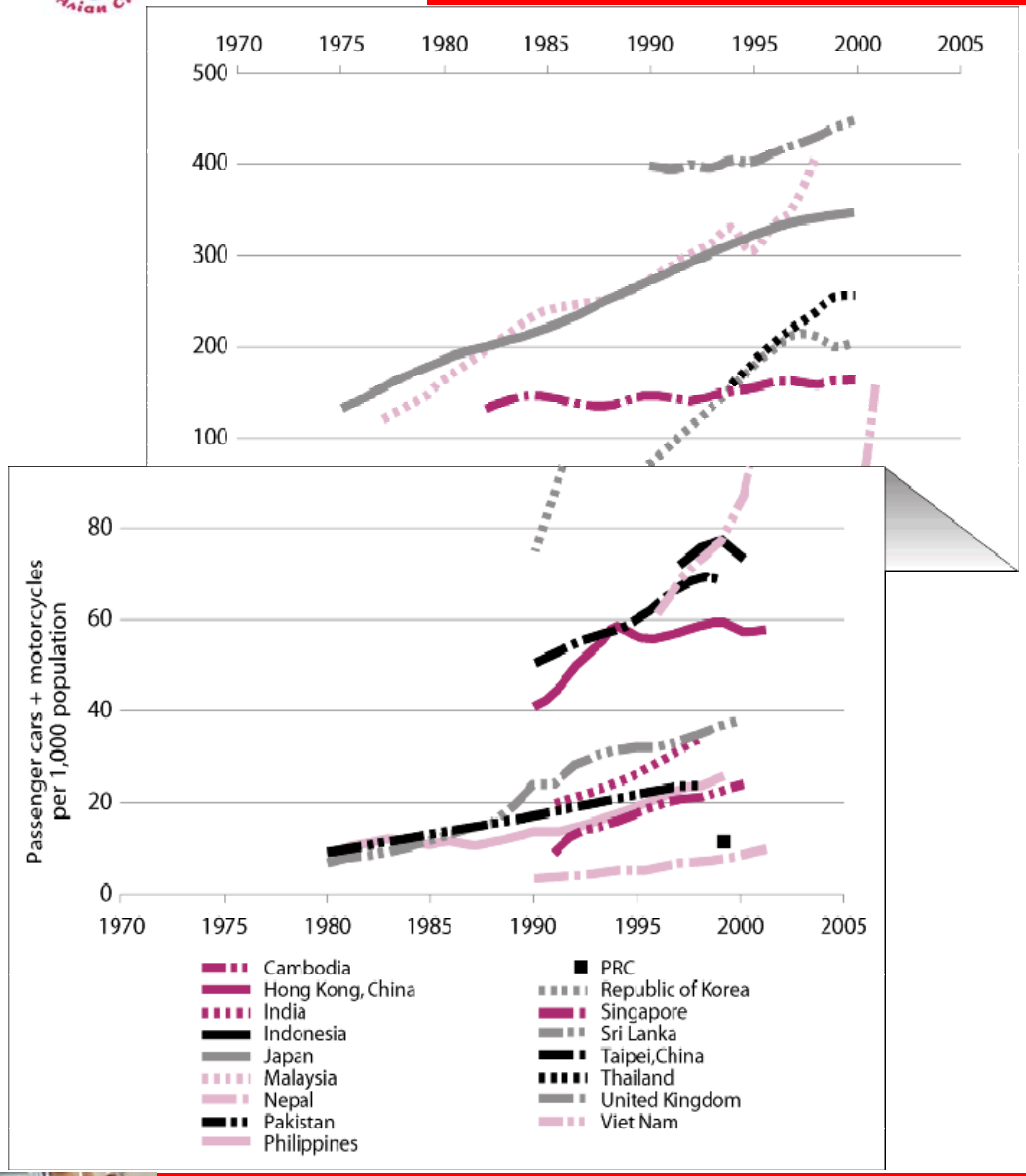


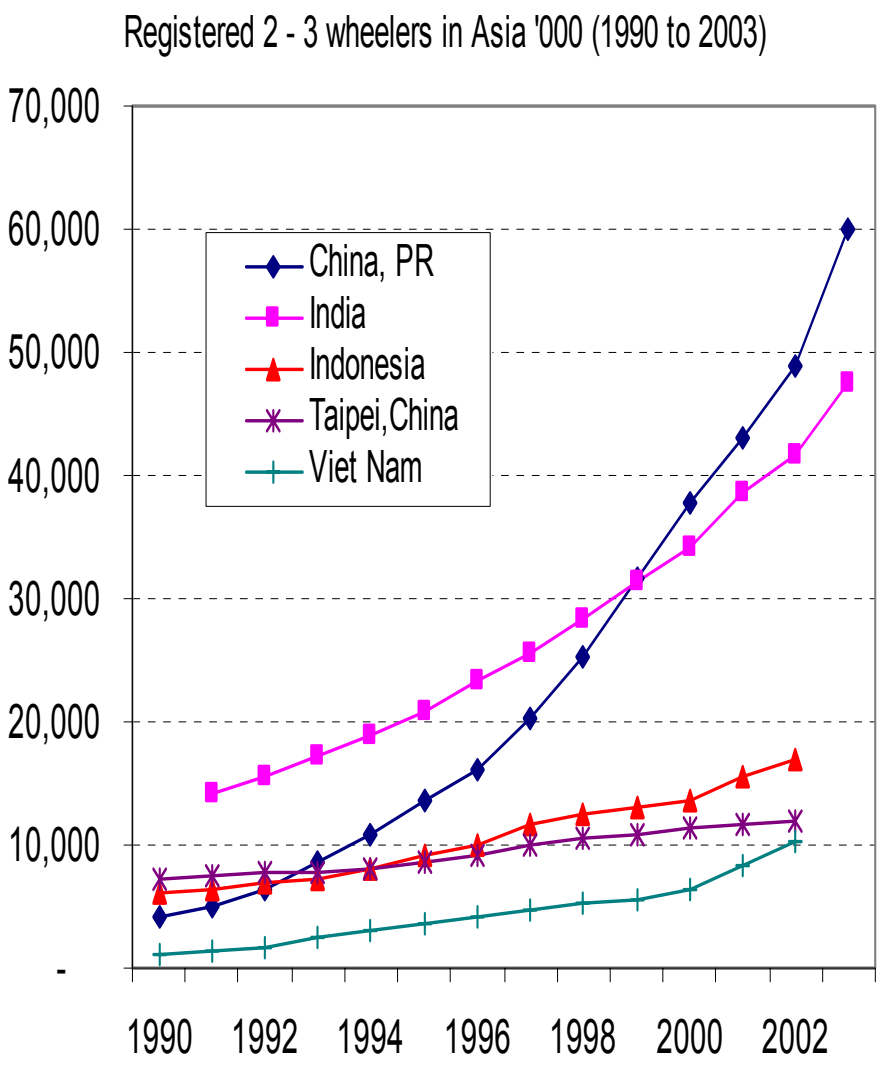
Source: BBC using Gall-Peters Map projection (2006) and UN DESA population data (2005)

- In the mid-1960s approximately 1 person out of 5 lived in a city
- In the mid-1990s the ratio became 1 person in 3
- It is expected that by 2020, approximately 1 in 2 people in Asia will be living in a city

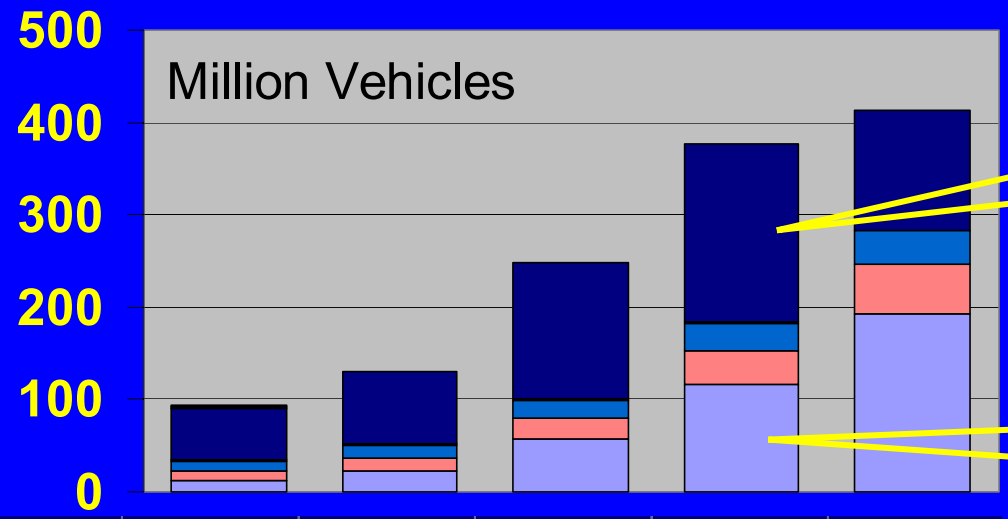
Urban population will rapidly increase in Asia from 2000 to 2025 - in China by 81% and in India by 87%

Drivers: Motorization in Asia





Drivers: Vehicle population growth in China



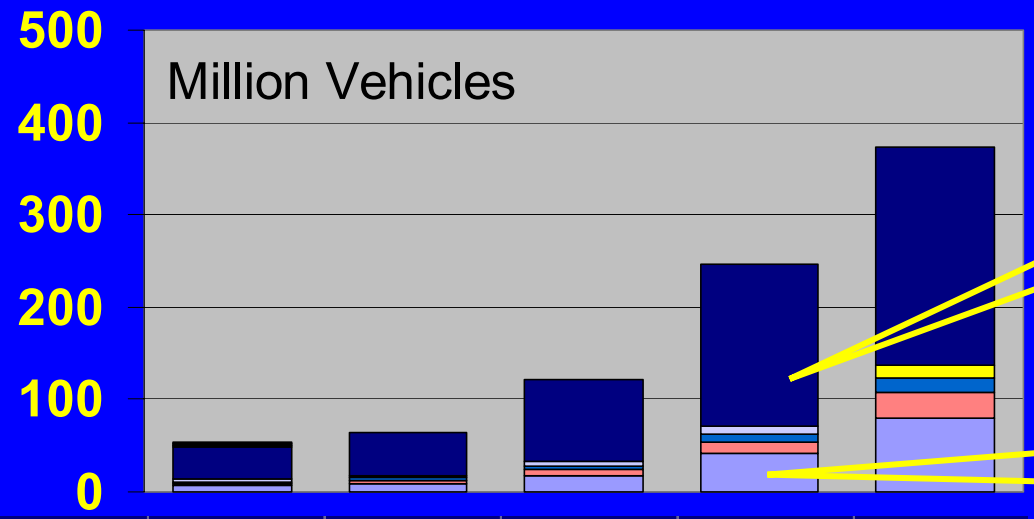
3.5 x by 2025

9 x by 2025

Class	2005	2008	2015	2025	2035
2-W	55.3	78.1	146.7	193.2	130.4
3-W	2.0	1.5	1.7	0.3	0.0
HCV	10.4	13.9	19.9	29.3	37.5
LCV	9.4	13.1	22.8	37.7	52.9
Car, SUV	12.9	23.4	56.8	115.8	192.7
Grand Total	90.0	130.0	248.0	376.4	413.6

Note: Vehicle Population Projection from Segment Y Ltd
See: http://segmenty.com

Drivers: Vehicle population growth in India



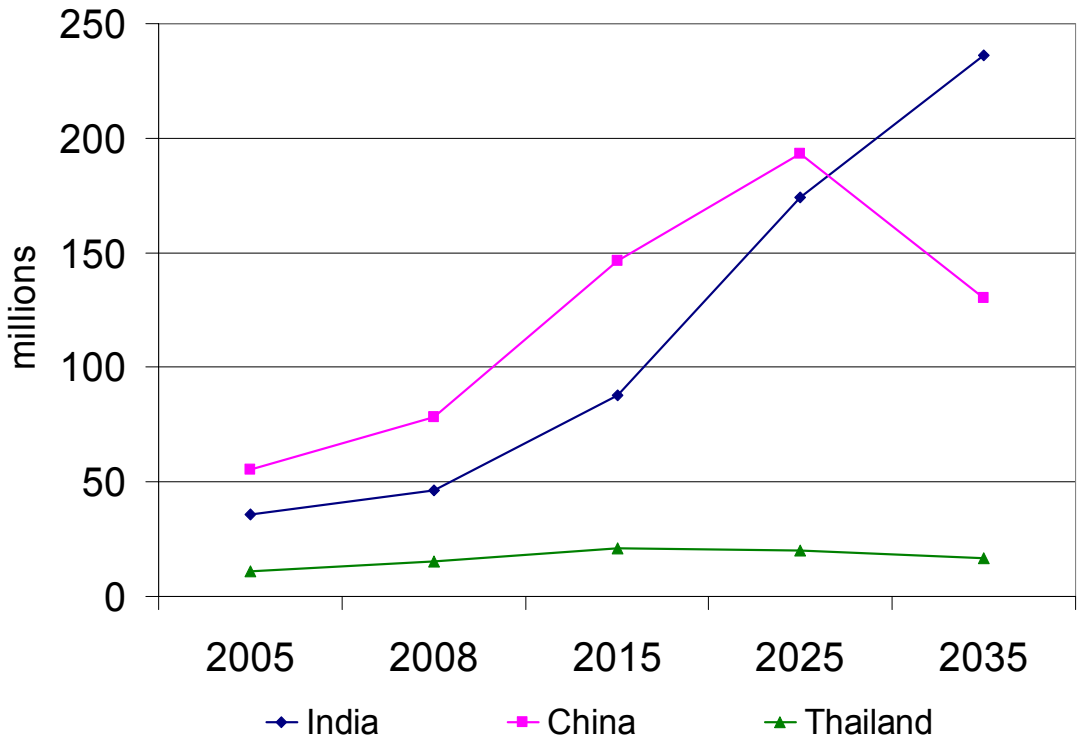
5 x by 2025

6.7 x by 2025

Class	2005	2008	2015	2025	2035
2-W	35.8	46.1	87.7	174.1	236.4
3-W	2.3	3.0	5.3	8.8	13.1
HCV	2.4	2.9	4.6	9.1	16.2
LCV	2.4	3.2	5.7	12.5	26.9
Car, SUV	6.2	8.8	18.0	41.6	80.1
Grand Total	49.1	63.9	121.3	246.1	372.7

Note: Vehicle Population Projection from Segment Y Ltd
See: http://segmenty.com

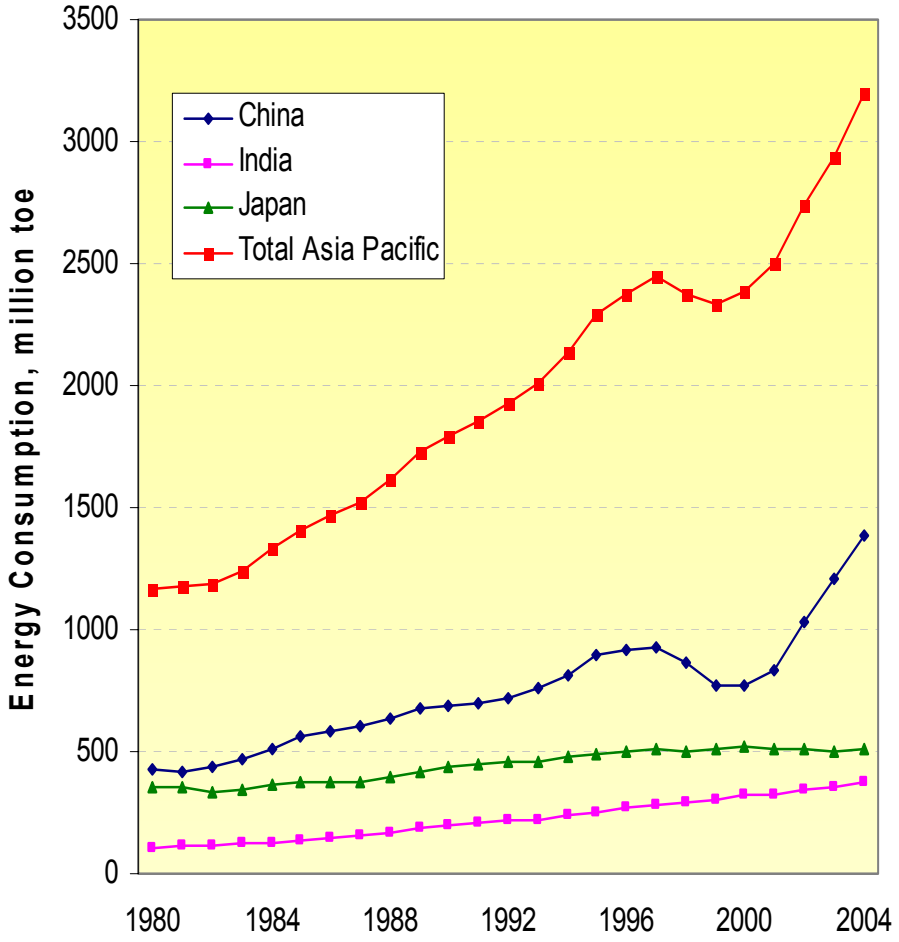
Drivers: Motorcycles in Asia



Note: The forecasts used in Figures 2 and 3 were developed by Segment Y Ltd

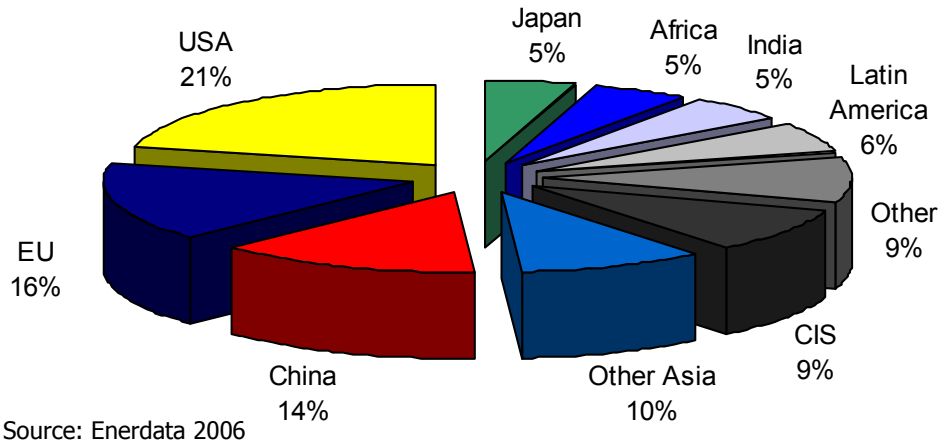
- Asia is different from Europe, USA and Japan – India, China and Thailand:
  - –2005: 100 million
  - –2008: 140 million
  - – 2015: 250 million
- When will the tipping point be reached after which people switch to cars: China 2025?
- Motor cycles now breaking into new markets e.g. Philippines
- 2-3 wheelers play an important role in transit in Asia, e.g.
  - –Tricycles in Philippines
  - –Rickshaws in South Asia
  - –Tuk-tuk in Thailand

Drivers: Energy Consumption



Source: BP Statistical Review of World Energy 2005

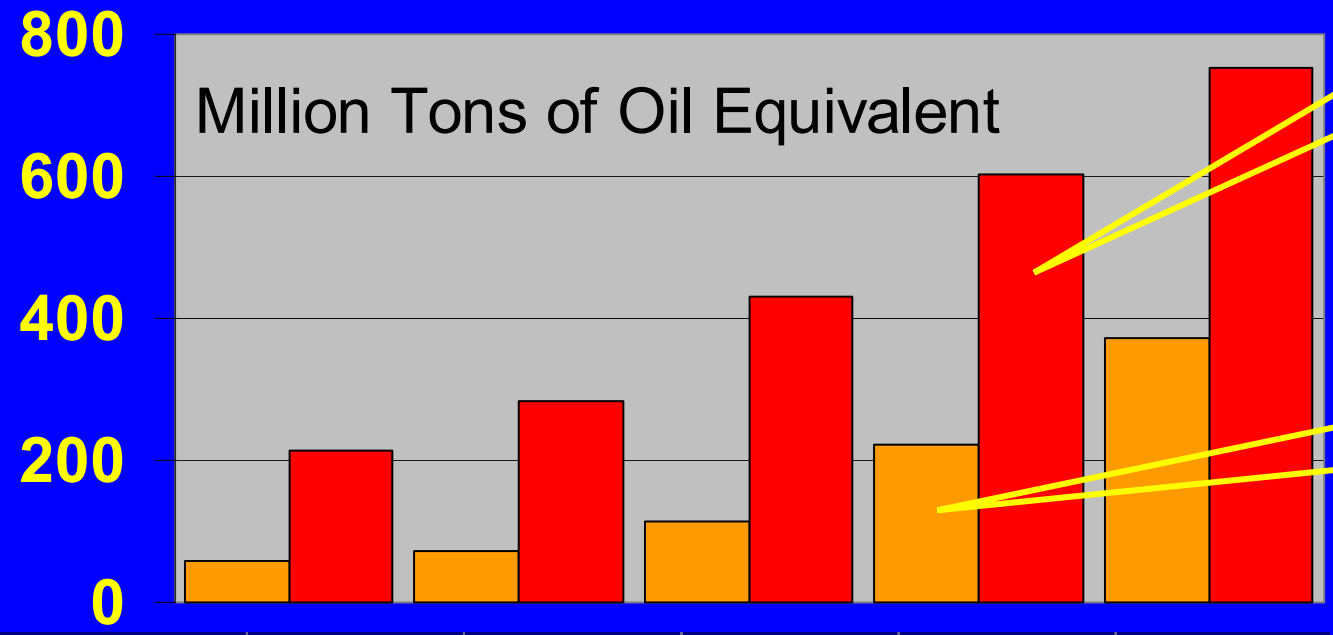
2004 World Energy Consumption Share, 10.97btoe



Source: Enerdata 2006

- Asia is responsible for 24 per cent of world energy consumption with China having a high share at 14 per cent.
- During the period 2002–2003, China accounted for 57% of the increase in world energy consumption
- India consumes a significant share of the world's energy demand (5%)
- India as well as China demand for energy is rapidly increasing

Drivers: Fuel Consumed by on-road transport



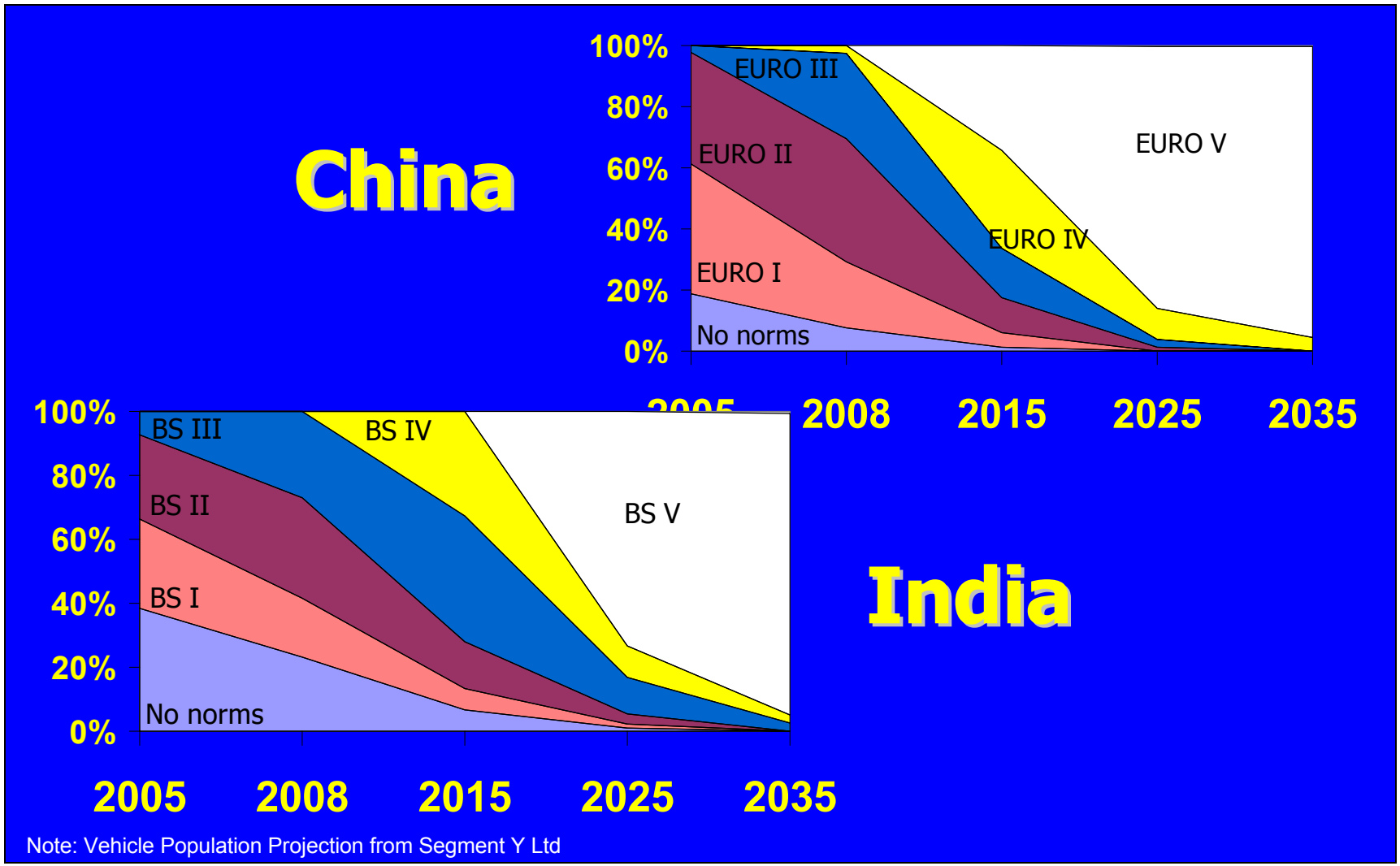
2.8 x China

3.8 x India

Economy	2005	2008	2015	2025	2035
China	215	284	431	602	753
India	58	73	115	221	371

Note: Segment Y Ltd. Vehicle Population Projection using IEA SMP model

Pressure: Emissions Standards in Car Populations



Pressure: Electric bikes in China: best kept secret

- Approximately 7.5 million electric bicycles were sold in China in 2004 rising to around 9.5 million in 2005 despite being banned in some key cities
- This dramatic growth has been largely due to legislation banning gasoline fuelled scooters and bicycles, introduced from 1996 onwards in several major Chinese cities, including Beijing and Shanghai.
- Electric bicycles come in many versions and there are about 260 companies in China making electric bikes and their components

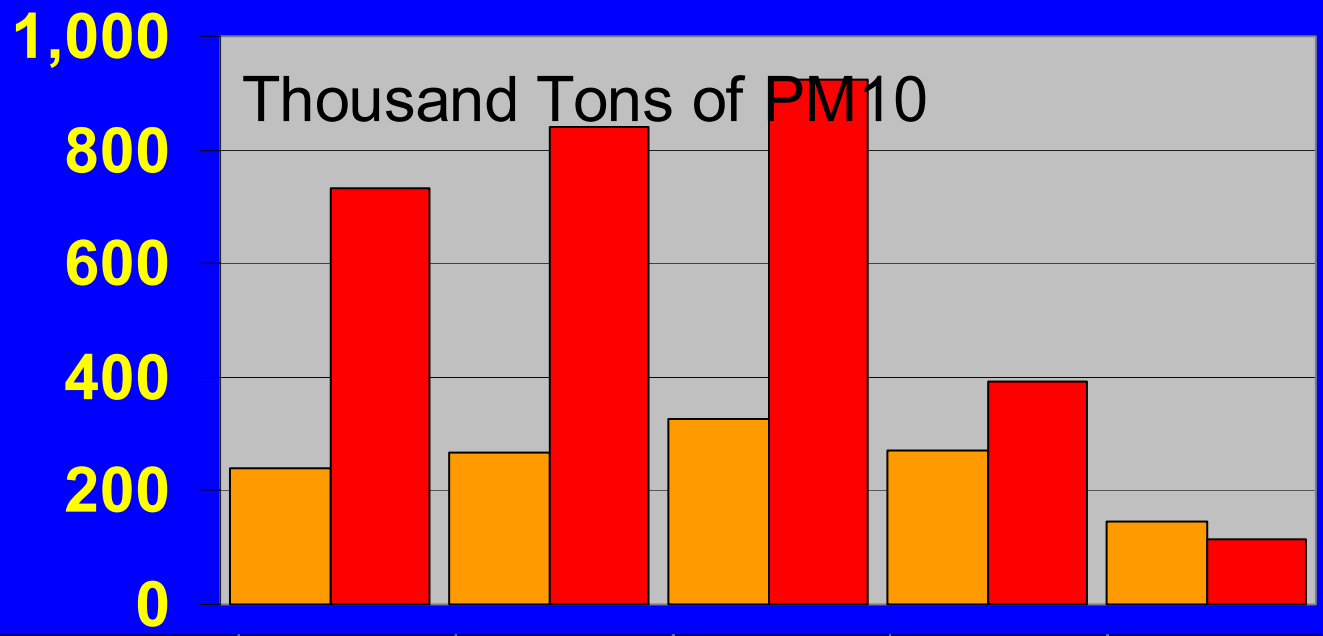
- They have a top speed of between 20 – 30kph and a range of 25 – 100 km. During operation they emit zero local air pollution, but they do use about 2 kWh of electricity per 100 km
- Power ranges between 200 - 600 W and they take around 6 – 8 hours to charge

Note: Various sources compiled by John Rogers (2006)

Pressure: Public Transport in Asia

- Public transport is mostly in the informal sector
- Mostly composed of poorly maintained and old buses
- Major source of PM emissions in the urban area
- Under-capitalized on capacity to generate internal savings, small-medium scale, no professional management
- Not part of an integrated transport system and difficult for them to be integrated in such

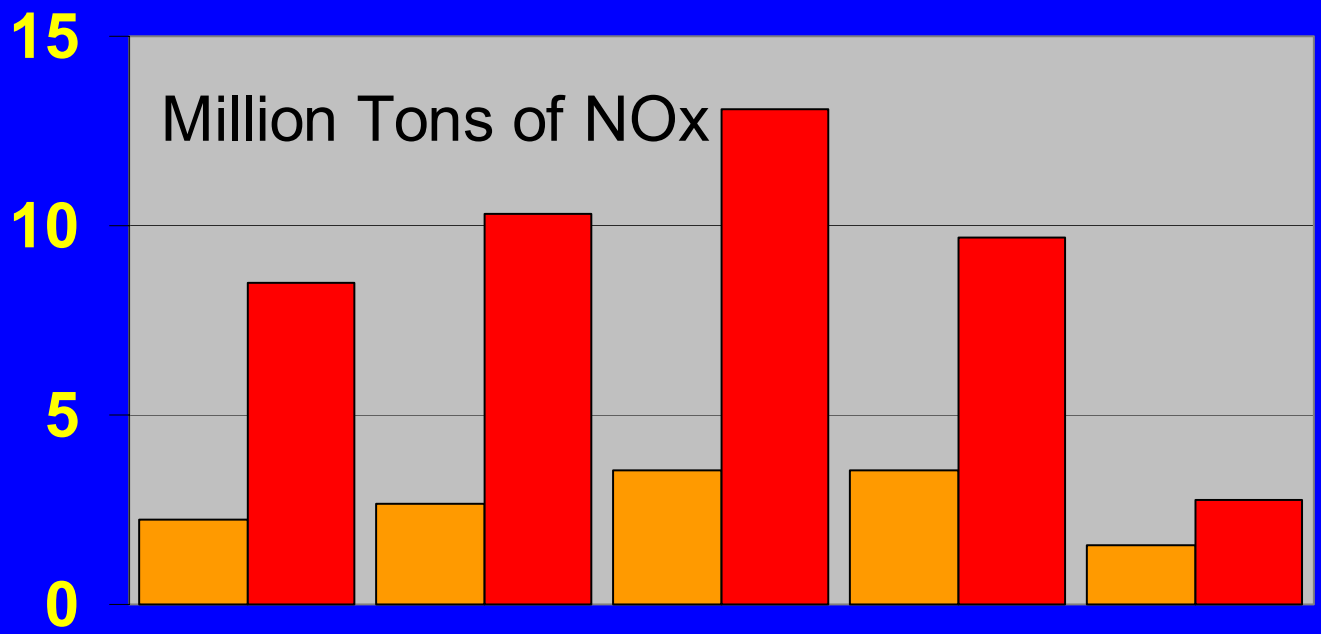
Pressure: PM10 emissions from on-road transport



Economy	2005	2008	2015	2025	2035
China	732	839	922	392	115
India	241	268	326	271	147

Note: Segment Y Vehicle Population Projection using IEA SMP model

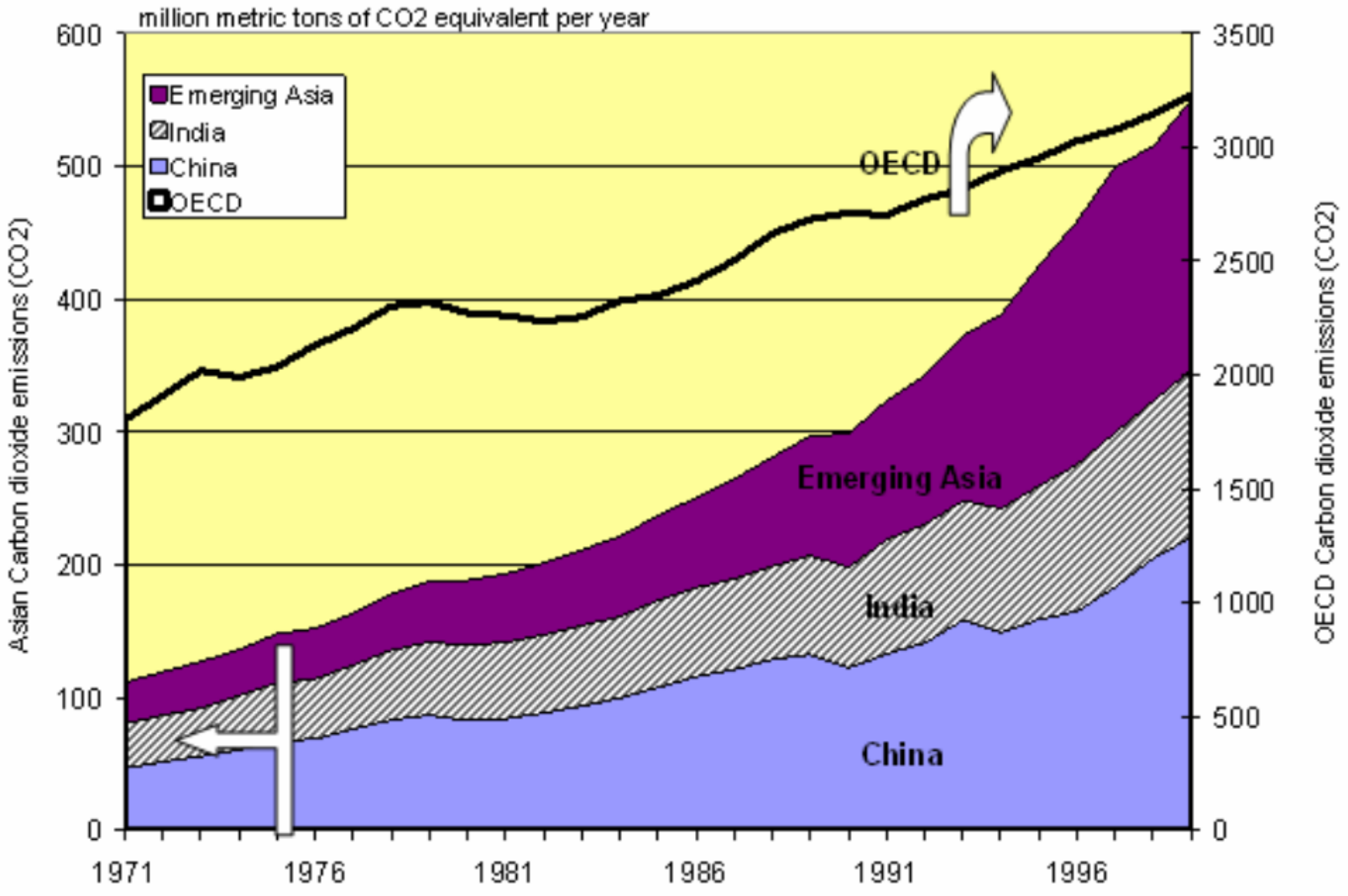
Pressure: NOx emissions from on-road transport



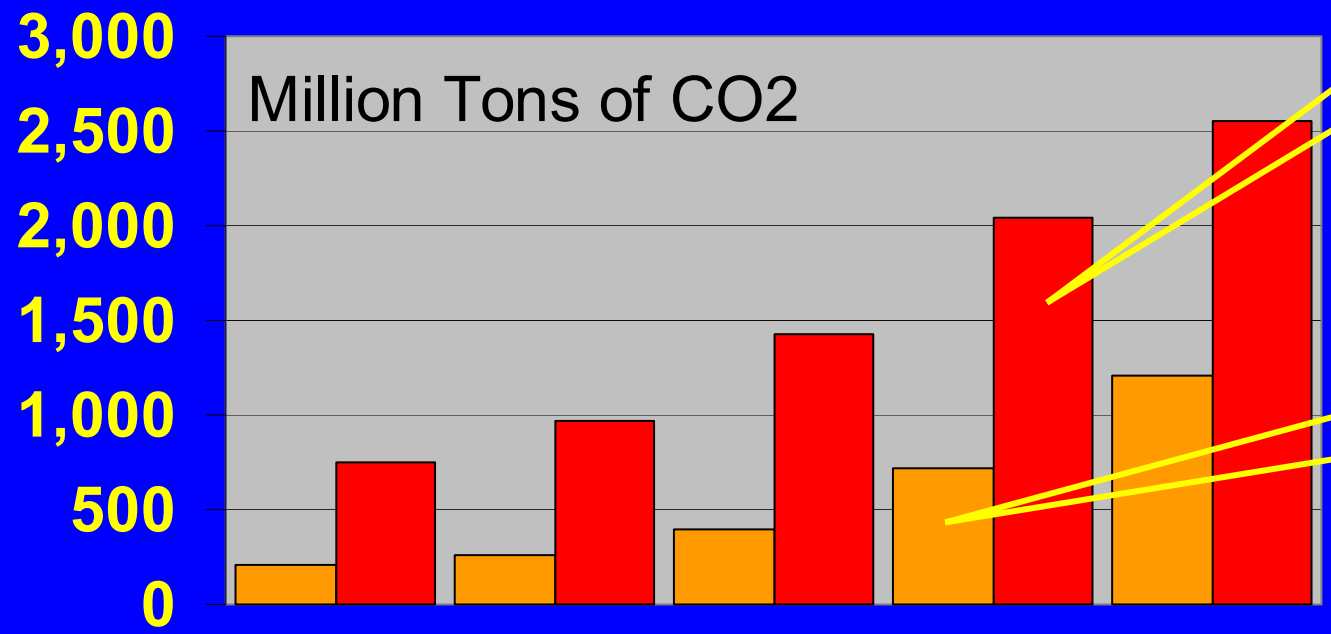
Economy	2005	2008	2015	2025	2035
China	8.5	10.3	13.1	9.7	2.8
India	2.2	2.6	3.5	3.6	1.6

Note: Segment Y Vehicle Population Projection using IEA SMP model

Pressure: GHG emissions from transport in China, India, and emerging Asia 1971 – 2000



Pressure: CO_2 emissions from on-road transport



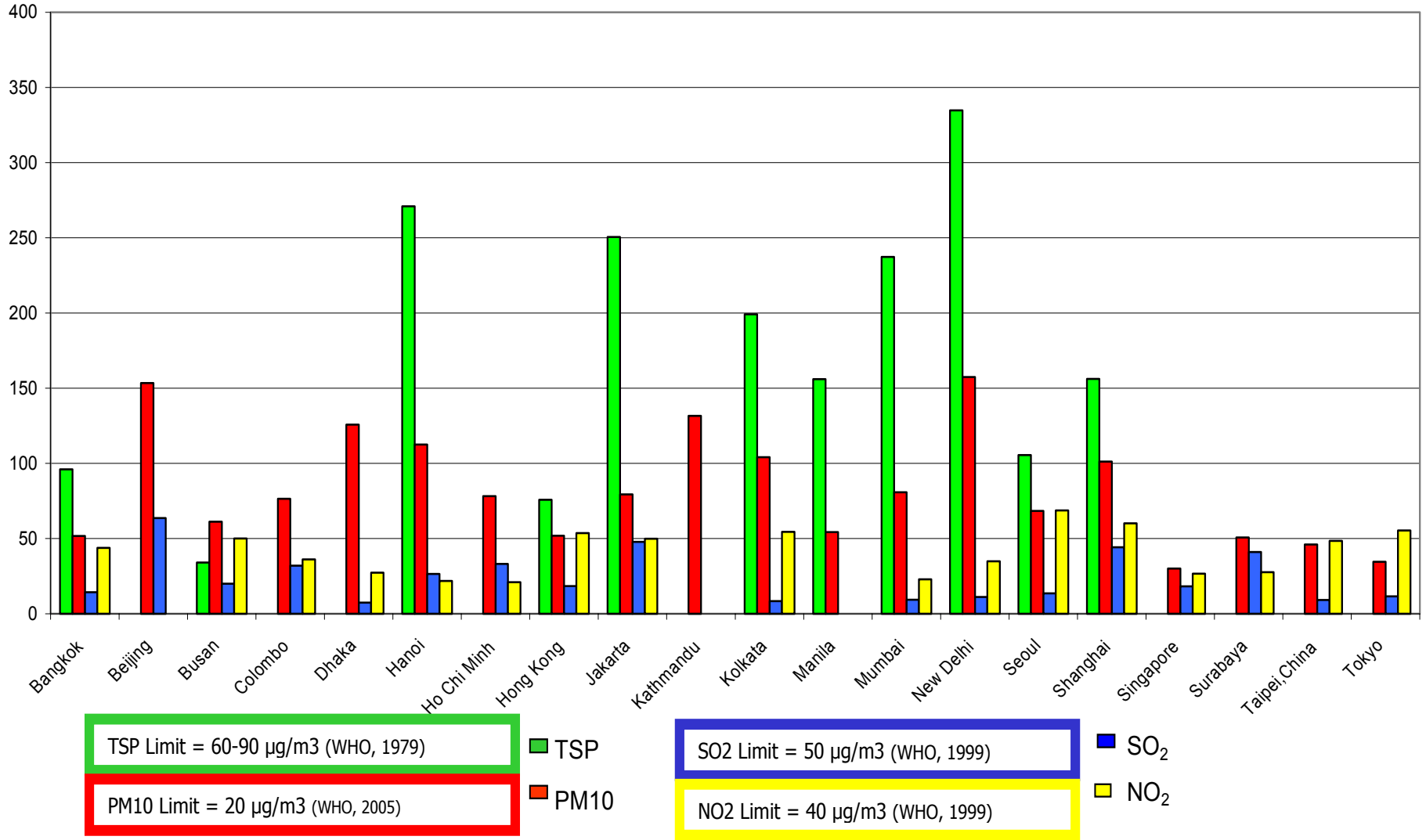
2.7 x China

3.5 x India

Economy	2005	2008	2015	2025	2035
China	752	967	1,429	2,039	2,557
India	208	256	391	721	1,212

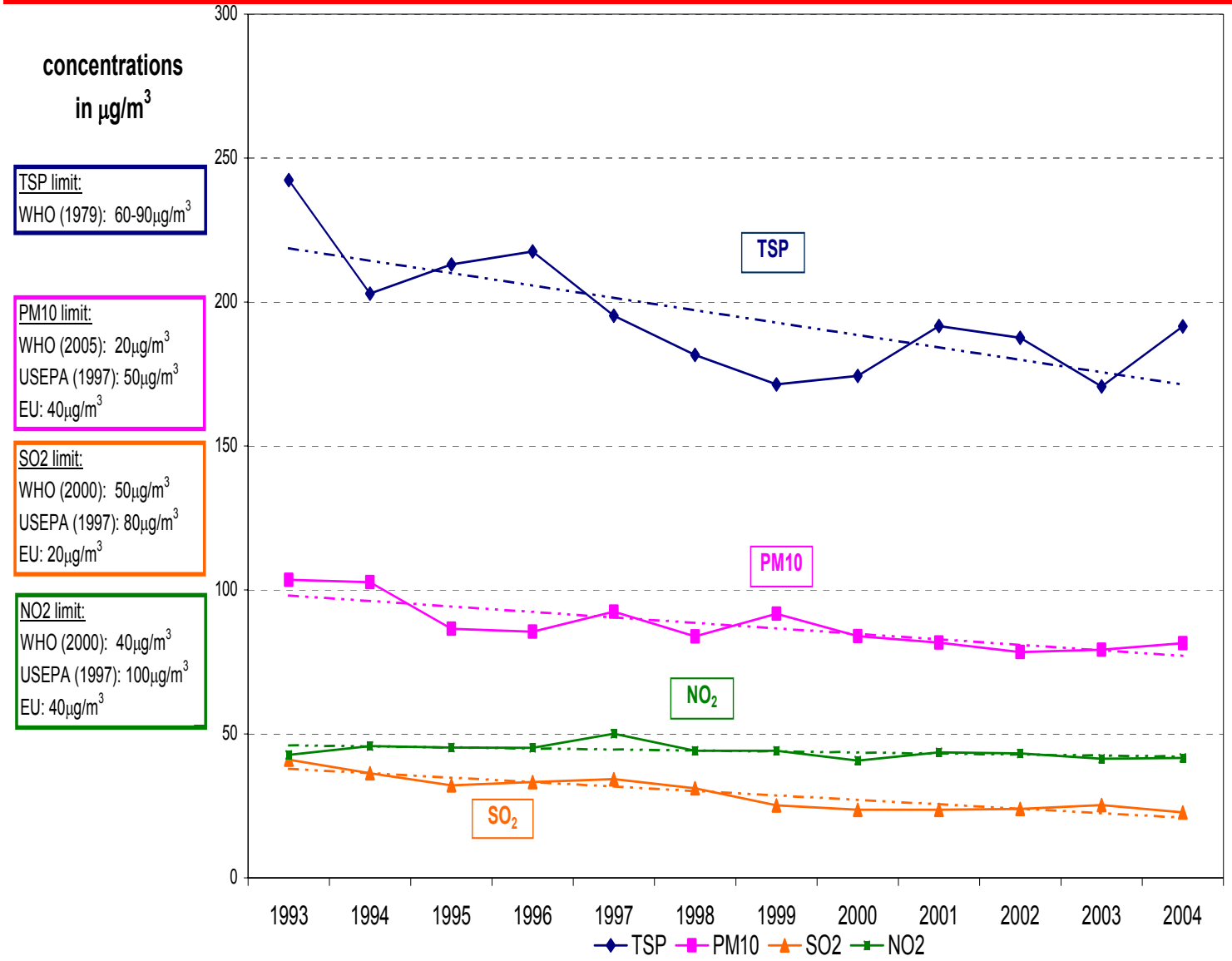
Note: Segment Y Vehicle Population Projection using IEA SMP model

State: Air Quality Status in Asia (1)

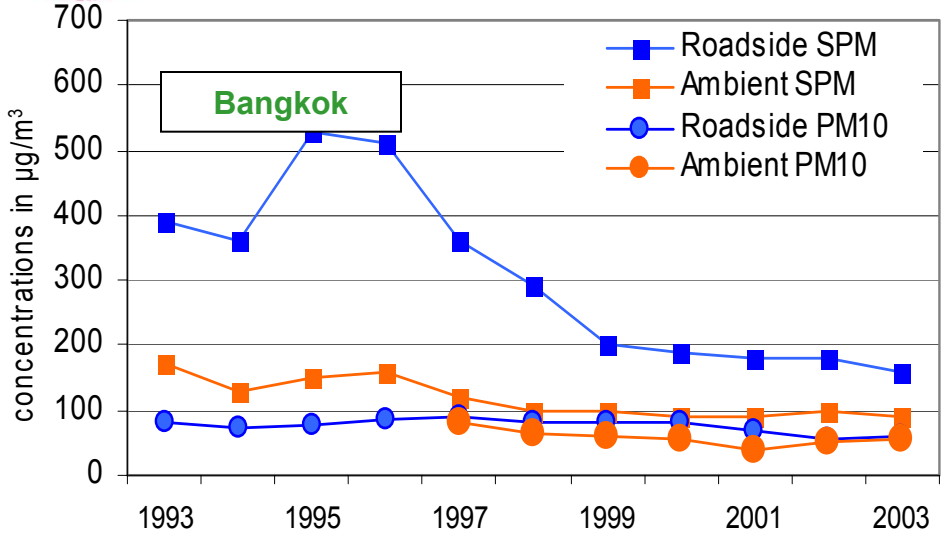


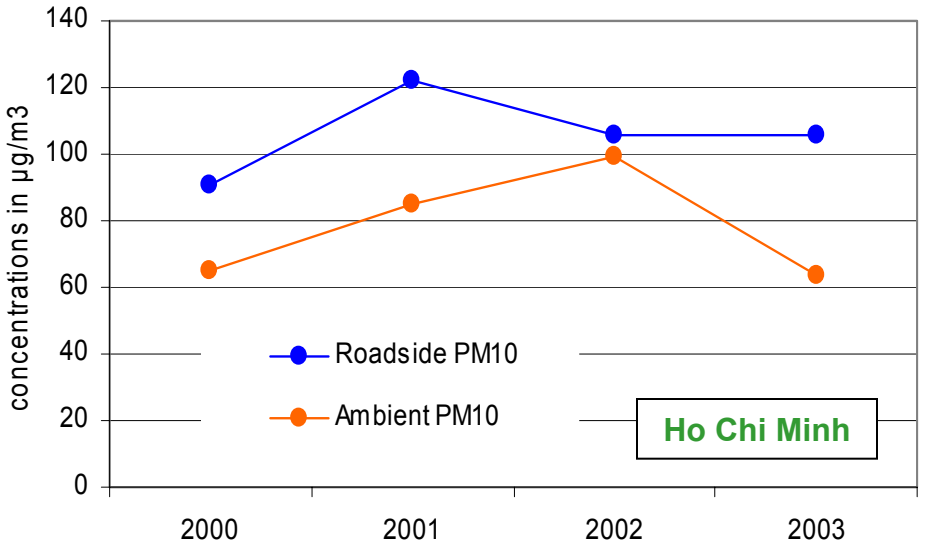
State: Air Quality Status in Asia (2)

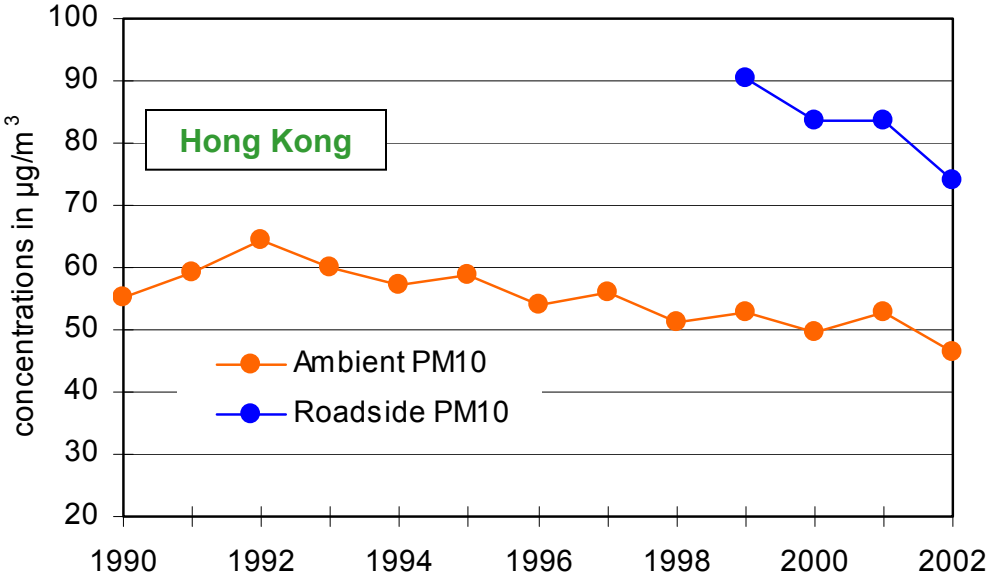
- Good news: Urban Air Quality in Asia has stabilized on average thanks to increased efficiency in AQM in Asia
- Bad news: Air quality levels (especially particulate matter) are still well beyond the WHO guideline values and also national standards



State: Roadside versus Ambient Particulate Matter Concentrations







- Roadside particulate levels are always higher than ambient confirming that vehicles are major PM source
- Increased number of policies on mobile sources (e.g. fuel quality and stricter emission standards) closes the gap between ambient and roadside levels

Note: SPM ambient annual standards = 100 µg/m³

PM10 ambient annual standards = 50 µg/m³

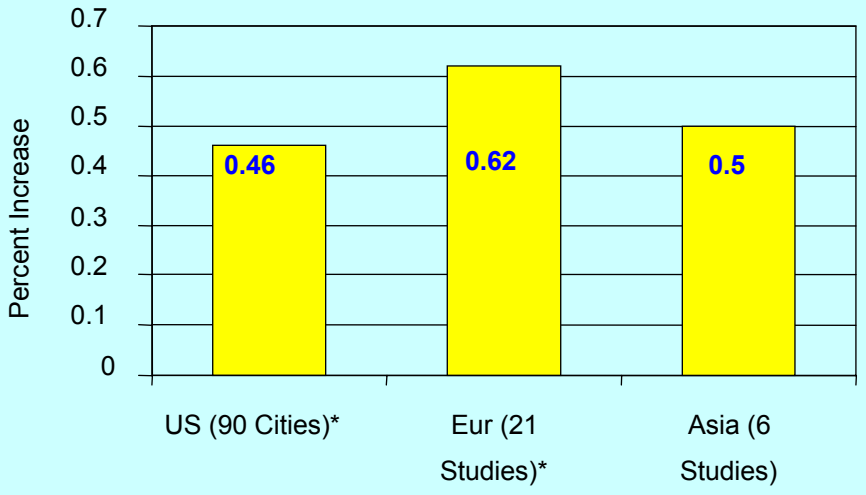
Impacts: Air Pollution on Public Health

Health Costs (per year)

- Manila US$392M
- Shanghai US$880M
- Bangkok US$424M
- India US$14 to $ 191.6M
- Jakarta US$ 100 M

Source: ADB 2002. Policy Guidelines on Reducing Vehicle Emissions

Exposure Risks



Source: Greenbaum and O'Keefe, BAQ 2003

"About 500,000 people die prematurely every year due to urban air pollution in Asia, according to WHO"

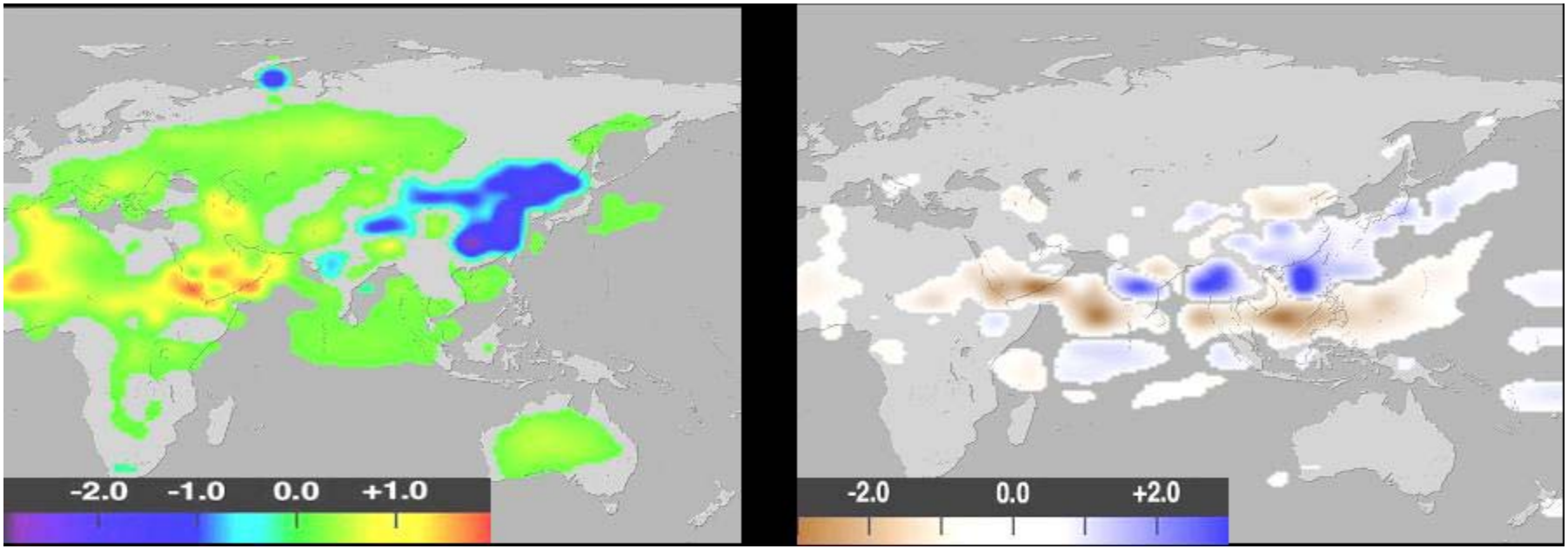
Impacts: Air Pollution on Agriculture

- Globally soybean is the 4th most important crop and is adversely affected by ozone at 40ppb
- A change from 30 ppb to 60 ppb decreases yield by 16%
- Ozone concentrations (1990 levels) in China, Japan and Korea caused the loss of 1% to 9% in annual yield of wheat, rice and corn and 23% to 27% annual yield loss of soybeans
- In 2020, grain loss due to ozone is projected as 2% to 16% for wheat, rice and corn and 28-35% for soybeans

Impacts: Air Pollution on Economy

- Economic evaluation of air pollution in Dhaka City (2003) states that cost totals to about Taka 124 billion = 3-4 % of national GDP
- 2002 Pakistan study estimated that approximately 16.28 million people which could be directly associated with economic cost of Rs.25.7 billion a year on account of health
- Average property damage due to urban air pollution in Colombo is Rs.12677 (US$ 126) per household per year (2004 estimate)
- Associated agriculture loss due to air pollution in 1990 - US$3.5 billion in China, $1.2B in Japan and $0.24B for Korea.
- Compliance with ozone standards would increase annual grain revenues by US$2.6-27 billion in China

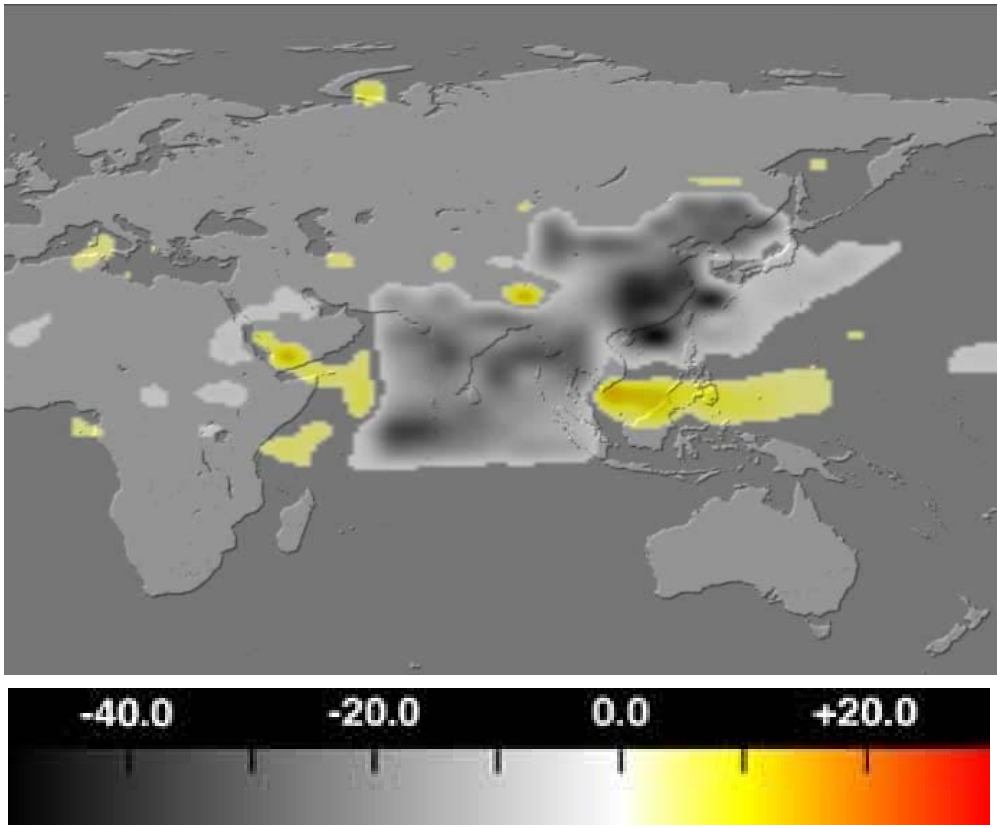
Impacts: Air Pollution on Climate (1)



- Black carbon can affect regional climate by absorbing sunlight, heating the air and thereby altering large scale atmospheric circulation and the hydrologic cycle.
- NASA climate study reveals that large amounts of black carbon (soot) particles and other pollutants are causing changes in precipitation and temperatures over China
- Working Group I Outline for The Fourth Assessment Report** (to be completed in 2007) will devote a specific section on "Air Quality and Climate Change" (under Chapter 7).

Source: NASA, 2002 - http://www.gsfc.nasa.gov/topstory/20020822blackcarbon.html

Impacts: Air Pollution on Climate (2)



Source: NASA, 2002 - http://www.gsfc.nasa.gov/topstory/20020822blackcarbon.html

- Soot blocks solar radiation from the ground thereby reducing crop yields
- Aerosol data from 46 ground stations in China, shows the decrease in solar energy reaching the ground (in black) during the summer months (June, July and August). Yellow shows where the sunlight has increased

Response: Ambient Air Quality Standards in Asia

Country	Pollutants	Remarks
Bangladesh	TSP, CO, NOx, and SO_2	1997 standards established for a few pollutants depending on land use category; new standards are pending approval
China	TSP, PM10, CO, SO_2, NO_2, Pb	Standards require cities to comply with Class I, II, or III standards. Class I standards more stringent than the WHO and USEPA limits
Hong Kong	TSP, PM10, CO, SO_2, NO_2, Pb, O_3	Standards less stringent than WHO and USEPA limits
India	TSP, PM10, CO, SO_2, NO_2, Pb	Established based on different land-use categories i.e. industrial, residential and sensitive areas.
Indonesia	TSP, PM10, CO, SO_2, NO_2, O_3, Pb	National and local (Jakarta) standards less stringent that WHO; PM limits less stringent than USEPA
Japan	CO, NO_2, O_3, SO_2, TSP	Comparable and to some extent more stringent than WHO guidelines with the exception of CO limits for an 8-hour exposure.
Nepal	TSP, PM10, CO, SO_2, NO_2, Pb, C_6H_6	Established only in 2003; standards less stringent than WHO; PM limits less stringent than USEPA
Pakistan		No legislated ambient air quality standards
Philippines	TSP, PM10, CO, SO_2, NO_2, O_3, Pb	based and comparable to WHO and USEPA (for PM_{10}). Standards more lenient, selecting the higher/max allowable limits
Singapore	PM10, CO, SO_2, NO_2, O_3	Despite adopting only both WHO guidelines and USEPA limits, Singapore PSI reporting is very efficient
Sri-Lanka	TSP, CO, SO_2, NO_2, O_3, Pb	TSP standards twice more lenient than USEPA, No annual standard for SO_2, 24-hour limit for SO_2, a slightly lenient O_3 and NO_2 compared with USEPA and WHO, respectively
Thailand	TSP, PM10, CO, SO_2, NO_2, O_3, Pb	TSP twice more lenient than USEPA; SO_2 and CO almost same as USEPA limit, stringent NO_2 compared to WHO
Vietnam	TSP, CO, SO_2, NO_2, O_3, Pb	Hourly limits for NO_2 and CO are more lenient than WHO, no PM10 standards, the rest of the standards are almost same as WHO

- **Most countries have more lenient standards than those prescribed by WHO and USEPA**
- **Standards for PM10 have been largely based on USEPA limits**
- **There is a need to review current PM standards – Europe has moved PM10 limit to 50µg/m³ limit for 24-hour averages and 40 µg/m³ for annual averages**
- **Standards for other air toxics e.g benzene should be legislated**
- **In some cases, AQ monitoring plans/ systems, are inconsistent with the established standards**
- **most Asian countries do not have specific roadside AQM standards**

Response: Comparison of PM Standards in Asia, Europe and US

Compound	Cities	TSP [µg/m^3]					PM_{10} [µg/m^3]			$PM_{2.5}$ [µg/m^3]	
Country		1 hr	3 hrs	8 hrs	24 hrs	1 yr	1 hr	24 hrs	1 yr	24 hrs	1 yr
WHO								50	20	25	10
EU								50	40		
USEPA								150	50	65	15
Bangladesh								150	50	65	15
China (Class II)					300	200		150	100		
Hong Kong, SAR, China					260	80		180	55		
India (residential, rural & other areas)					200	140		100	60		
Indonesia					230	90		150			
	Jakarta				230	90		150			
	Surabaya				230	90		150			
Japan							200	100			
Republic of Korea								150	70		
	Busan							150	70		
	Seoul							120	60		
Nepal					230			120			
Philippines					230	90		150	60		
Singapore								150	50	65	15
Sri Lanka		500	450	350	300	100					
Taiwan, China								150	65		
Thailand					330	100		120	50		
Vietnam								150	50		

Source: Urban Air Pollution in Asian Cities (2006) – for publication

Response: Air Quality Monitoring Stations

City	Manual	Continuous
Bangkok		21
Beijing		24
Busan		14
Colombo	1	
Delhi	10	2
Dhaka		1
Hanoi	7	
Ho Chi Minh		9
Hong Kong		14
Jakarta	1	5
Kathmandu	6	

City	Manual	Continuous
Kolkata	12	5
Manila	12	5
Mumbai	22	
Osaka		14
Seoul		27
Shanghai	23	21
Singapore		16
Surabaya		5
Taipei		19
Tokyo		82
Yogyakarta	6	

Source: Urban Air Pollution in Asian Cities (2006) – for publication

Response: Online AQ Information

City	Website URL
Beijing	http://www.bjepb.gov.cn/
Shanghai	http://www.sepb.gov.cn/user/outweb/index-en/index-en.jsp
Chengdu	http://www.hbj.chengdu.gov.cn/
Chongqing	http://www.cqemc.cn/
Guangzhou	http://www.gzepb.gov.cn/
Jilin/Harbin	http://hbj.jl.gov.cn/
Hangzhou	http://ems.hzepb.gov.cn/20031224/index.htm
Tianjin	http://www.zjepb.gov.cn/
Kolkata	http://www.wbpcb.gov.in/html/airquality.php
Mumbai	http://mpcb.mah.nic.in/envtdata/envtair.php
New Delhi	http://www.cpcb.delhi.nic.in/
Tokyo	http://www2.kankyo.metro.tokyo.jp/kansi/portal.htm
Busan	http://www.bihe.re.kr/
Kathmandu	http://mope.gov.np/mopepollution/
Metro Manila	http://www.emb.gov.ph/
Singapore	http://www.nea.gov.sg/psi/
Thailand	http://pcd.go.th/AirQuality/bangkok/
Ho Chi Minh	http://www.hepa.gov.vn/

Response: Vehicle Emission Standards

Country	95	96	97	98	99	2000	01	02	03	04	05	06	07	08	09	10
European Union	Euro 1		Euro 2				Euro 3				Euro 4			Euro 5		
Bangladesh									*Euro 2 (under discussion)*							
Hong Kong, China		Euro 1		Euro 2			Euro 3					Euro 4				
India[a]							Euro 1				Euro 2					E3
India[b]					E1		Euro 2				Euro 3					
Indonesia											Euro 2					
Malaysia			Euro 1			Euro 2										*E4*
Nepal						Euro 1										
Philippines									Euro 1							
PRC[a]							Euro 1			Euro 2				Euro 3		
PRC[c]							Euro 1		Euro 2		Euro 3					
Singapore[e]	Euro 1						Euro 2									
Singapore[g]	Euro 1						Euro 2					Euro 4				
Sri Lanka									Euro 1							
Taipei,China					US Tier 1								US Tier 2 for diesel[d]			
Thailand	Euro 1						Euro 2			Euro 3					Euro4	
Viet Nam[e]				Euro 1										*Euro 2*	*E3*	
Viet Nam[f]											Euro 1			*Euro 2*	*E3*	

Note: For light-duty vehicles

Source: CAI-Asia, 2006

Response: Sulfur Levels in Diesel

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Bangladesh							5000									
Cambodia					2000											
Hong Kong, China		500					50					*10 - under consideration*				
India (nationwide)	5000				2500					500					350	
India (metros)	5000				2500	500				*350*					*50*	
Indonesia	5000															
Japan[a]	500									50		10				
Malaysia	5000		3000				*500 - marketed*			500					*50*	
Pakistan	10000						5000									
Philippines	5000					2000			500							
PRC (nationwide)	5000						2000			*500 - widely used*						
PRC - Beijing	5000						2000		500	350						
Republic of Korea	500							430			30				10	
Singapore	3000		500								50					
Sri Lanka	10000							5000	3000/ 500			500				
Taipei,China	3000			500			350			50						
Thailand	2500			500					350						50	
Viet Nam	10000							2500			500					
European Union					500					50/ 10			10			
United States	500										15					

Source: CAI-Asia, 2006

Response: Public Transport Trends in Asia – BRT

- TransJakarta, the 1st closed BRT system in Asia, will open 4 new corridors by December or a total of 7 busway corridors by the end of the year
- Growing interest on BRT systems
  - PRC: Kunming, Chongqing, Beijing;
  - S. Korea (by 2012): Seoul, Inchon;
  - PHI: Metro Manila, Cebu;
  - IND: New Delhi (target 300km), Bangalore, Chennai

Above: TransJakarta; Below: Beijing BRT.
Photo credits: ITDP

Bus Rapid Transit in Asia

Systems in operation (15):

Akita, Japan
Ankara, Turkey
Beijing, China
Fukuoka, Japan
Gifu, Japan
Jakarta, Indonesia
Kanazuwa, Japan
Kunming, China
Miyazaki, Japan
Nagaoka, Japan
Nagoya, Japan
Nigata, Japan
Seoul, South Korea
Shijiazhuang, China
Taipei,China

Systems in planning or under construction (24):

Ahmedabad, India
Bangalore, India
Bangkok, Thailand
Chengdu, China
Chongqing, China
Delhi, India
Guangzhou, China
Hangzhou, China
Huai'an, China
Hyderabad, India
Incheon, South Korea
Jinan, China
Karachi, Pakistan
Metro Manila, Philippines
Pune, India
Shanghai, China
Shengyan, China
Surabaya, Indonesia
T'aichung, China
T'ainan, China
Tienjing, China
Wuhan, China
Xi'an, China
Xiamen, China

Response: Stationary Sources

- Generally, countries in Asia have Industrial Emission Standards in place however strengthened implementation and monitoring is needed
- Efforts to reduce industrial pollution in Asia often focus on developing environmental institutions and legal frameworks either through command-and-control regulations or through economic instruments
  - command and control - guidelines/standards, enforcement and monitoring
  - economic instruments - environmental charges, environmental incentives (subsidies and tax credits), emissions trading
- Reduction of air pollution from stationary sources in Asia are still mostly "end-of-pipe" treatments, while economic incentives are not optimized
- Most Asian countries have adopted cleaner production strategies calling for substituting cleaner fuel sources and using fuels more efficiently
  - China and India are taking steps to limit the use of coal high in sulfur, substituting other energy sources such as hydroelectric power

Benchmarking UAQM Capability of Asian Cities

Benchmarking Study Approach

City Profiles and AQ Data

Compilation of information on current policy and practice for key components of AQM

AQM Capability Questionnaire

Questionnaire to assess AQM capability sent to city authorities

- In collaboration with Stockholm Environment Institute in their Air Pollution in the Megacities of Asia Project and the CAI-Asia Network

Response: Air Quality Measurement Index

Bangkok	●●●●●	Kolkata	●●●
Beijing	●●●●●	Metro Manila	●●●
Busan	●●●●●	Mumbai	●●●
Colombo	●●●	New Delhi	●●●●●
Dhaka	●●	Seoul	●●●●●
Hanoi	●●●	Shanghai	●●●●●
Ho Chi Minh	●●●●●	Singapore	●●●●●
Hong Kong	●●●●●	Surabaya	●●
Jakarta	●●●	Taipei	●●●●●
Kathmandu	●	Tokyo	●●●●●

Minimal ● Limited ●●
Moderate ●●● Good ●●●● Excellent ●●●●●

- Six cities measure the acute and chronic health effects for all criteria compounds (NO_2, SO_2, PM, CO, Pb, O_3)
- Nine cities measure trends in pollutant concentrations for all criteria compounds
- Five cities measure the spatial distriubution for all compounds
- 11 cities have the capacity to measure kerbside criteria for all compounds
- Rigorous QA/QC criteria are applied in eight cities

Response: Air Quality Assessment and Availability Index

Bangkok	●●●●●	Kolkata	●●●
Beijing	●●●●●	Metro Manila	●●
Busan	●●●	Mumbai	●●●
Colombo	●	New Delhi	●●●
Dhaka	●●	Seoul	●●●●
Hanoi	●●	Shanghai	●●●●●
Ho Chi Minh	●●●	Singapore	●●●●●
Hong Kong	●●●●●	Surabaya	●●
Jakarta	●●●	Taipei	●●●●●
Kathmandu	●●	Tokyo	●●●●●

Minimal ● Limited ●●
Moderate ●●● Good ●●●● Excellent ●●●●●

- 11 cities undertake prediction modelling for pollutants monitored
- 11 cities have undertaken epidemiological studies
- 10 cities issue air quality alerts
- 9 cities undertake spatial mapping of pollutants
- 11 cities formally publish AQ data

Response: Emission Estimated Index

Bangkok	●●●●	Kolkata	●●●
Beijing	●●●	Metro Manila	●●●●
Busan	●●●●●	Mumbai	●●●
Colombo	●●●●	New Delhi	●●●●
Dhaka	●	Seoul	●●●●●
Hanoi	●●	Shanghai	●●●●
Ho Chi Minh	●●	Singapore	●●●●●
Hong Kong	●●●●●	Surabaya	●●
Jakarta	●●●●	Taipei	●●●●●
Kathmandu	●●	Tokyo	●●●●●

Minimal ● Limited ●●
Moderate ●●● Good ●●●● Excellent ●●●●●

- 14 cities have emission estimates for major source categories (industrial, mobile and domestic/commercial)
- 15 cities have emission estimates for all criteria pollutants (PM, CO, SO_2, NO_2 and HC)
- 8 cities have estimates of emissions based on actual measurements
- 6 cities cross check estimates

Response: Air Quality Management Index

Bangkok	●●●●	Kolkata	●●●●
Beijing	●●●●	Metro Manila	●●●●
Busan	●●●●●	Mumbai	●●●●
Colombo	●●	New Delhi	●●●●
Dhaka	●●●	Seoul	●●●●●
Hanoi	●●	Shanghai	●●●●
Ho Chi Minh	●●●	Singapore	●●●●●
Hong Kong	●●●●●	Surabaya	●●●
Jakarta	●●●	Taipei	●●●●●
Kathmandu	●●	Tokyo	●●●●●

Minimal • Limited ●●
Moderate ●●● Good ●●●● Excellent ●●●●●

- 11 cities have AQ standards for all criteria pollutants
- 17 cities have emission limits and controls on stationary and mobile sources
- 13 cities impose penalties for th exceedance of both stationary and mobile emissions

Qualitative Classification of AQM Capabilities of Selected Asian Cities

Original Capability Scoring	Original Capability Classification	New Capability Scoring	New Capability Classification	Cities
81-100	Excellent	91-100	Excellent I	Hong Kong, Singapore, Taipei, Tokyo
		81-90	Excellent II	Bangkok, Seoul, Shanghai
61-80	Good	71-80	Good I	Beijing, Busan
		61-70	Good II	New Delhi
41-60	Moderate	51-60	Moderate I	Ho Chi Minh City, Jakarta, Kolkata, Metro Manila, Mumbai
		41-50	Moderate II	Colombo
21-40	Limited	31-40	Limited I	Hanoi, Surabaya
		21-30	Limited II	Dhaka, Kathmandu
0-20	Minimal	0-20	Minimal	-

Part 2:
Introduction to CAI-Asia

Rationale for CAI-Asia

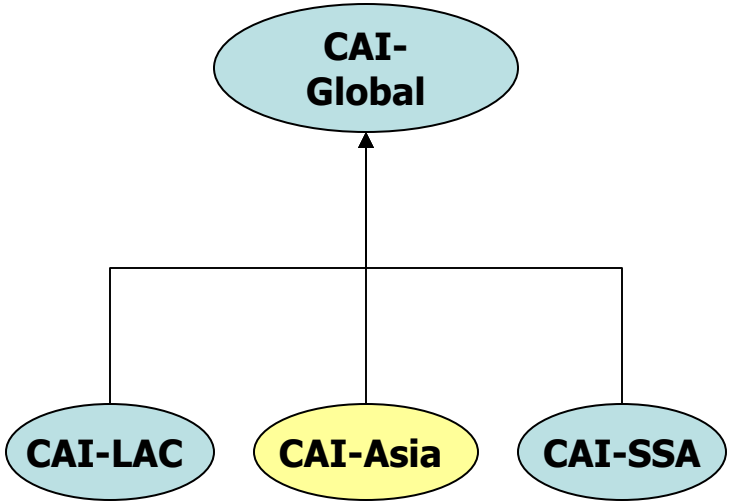
- In 2000 and 2001 there was a growing internal awareness on the need for a regional movement on air quality in Asia
- Emerging consensus that air pollution was a growing developmental problem and that it was not being addressed by any of the multilateral organizations such as UNEP, UN-ESCAP or ASEAN
- CAI-Asia benefited from the experience of the Clean Air Initiative for Latin American Cities which was established about 2 years before CAI-Asia

Goal and Objectives

CAI-Asia initiates, coordinates, and in selected cases implements AQM initiatives with the aim to improve air quality management and air quality in Asian Cities

CAI-Asia Components:

- Knowledge Management
- Capacity building
- Policy and regulatory frameworks
- Integrated air quality management policies and strategies
- Piloting projects to encourage innovation



CAI-Asia Membership

CITIES

Dhaka, Bangladesh
Chittagong, Bangladesh
Phnom Penh, Cambodia
Chengdu, China
Chongqing, China
Hangzhou, China
Harbin, China
Guangzhou, China
Tianjin, China
Hyderabad, India
Mumbai, India
Pune, India
Jakarta, Indonesia
Surabaya, Indonesia
Yogyakarta, Indonesia
Ulaanbaatar, Mongolia
Kathmandu, Nepal
Lahore, Pakistan
Islamabad, Pakistan
MMDA, Philippines
Makati, Philippines
Naga, Philippines
Singapore NEA
Colombo, Sri Lanka
Bangkok, Thailand
Chang Mai, Thailand
Haiphong, Vietnam
Hanoi, Vietnam
Ho Chi Minh City, Vietnam

Government Agencies

- Andhra Pradesh Pollution Control Board
- Balochistan EPA, Pakistan
- Central Pollution Control Board, India
- Department of Energy, Philippines
- Department of Environment and Natural Resources (DENR), Philippines
- Department of Environment, Bangladesh
- Department of Forest, Ecology and Environment, India
- Department of Transportation and Communications, Philippines
- Dhaka Transport Coordination Board, Bangladesh
- Environmental Management Bureau (EMB), Philippines
- Environmental Management Bureau, Ministry of the Environment, Japan
- Environmental Protection Agency (EPA), Afghanistan
- Environmental Protection Department of Hong Kong SAR (EPD)
- Hydrocarbon Development Institute of Pakistan
- Ministry of Environment, Cambodia
- Ministry of Environment, Indonesia
- Ministry of Public Works and Transport, Cambodia
- Ministry of Road Transport and Highways, India
- Pakistan Environmental Protection Agency (Pak-EPA)
- Pollution Control Department (PCD), Thailand
- SUPARCO
- Sindh Environmental Protection Agency
- State Environmental Protection Administration (SEPA)
- Vietnam Register

59 NGOs and Academic Institutions in the Region

DEVELOPMENT AGENCIES

Asian Development Bank
German Agency for Technical Cooperation (GTZ)
Government of Finland
Government of Japan
Government of Norway
Government of the Netherlands
Hewlett Foundation
IUCN - The World Conservation Union
Sida
The World Bank
USAID/USAEP
United States Environmental Protection Agency (EPA)

FULL PRIVATE SECTOR Member

Ford **Shell**

ASSOCIATE PRIVATE SECTOR Member

Asian Clean Fuels Association (ACFA)
Corning Incorporated
DEKRA AG
IPIECA
Johnson Matthey
MAHA Maschinenbau Haldenwang GmbH
SGS (Societe General de Surveillance)
Clean Diesel Tech. Inc.

CAI-Asia Local Networks (1)

Phase I (2005- Sept 2006)

- China
  CAI-Asia China Project Office
- Indonesia
  Mitra Emisi Bersih
- Nepal
  Clean Air Network-Nepal
- Pakistan
  Pakistan Clean Air Network
- Philippines
  Partnership for Clean Air
- Sri Lanka
  CleanAirSL
- Vietnam
  Viet Nam Clean Air Partnership

Phase II (Oct 2006-2007)

- Bangladesh
- Bhutan
- Cambodia
- India
- Mongolia
- Thailand

The ultimate success of CAI-Asia will be determined by the success of its local networks

General Update on Local Networks (2)

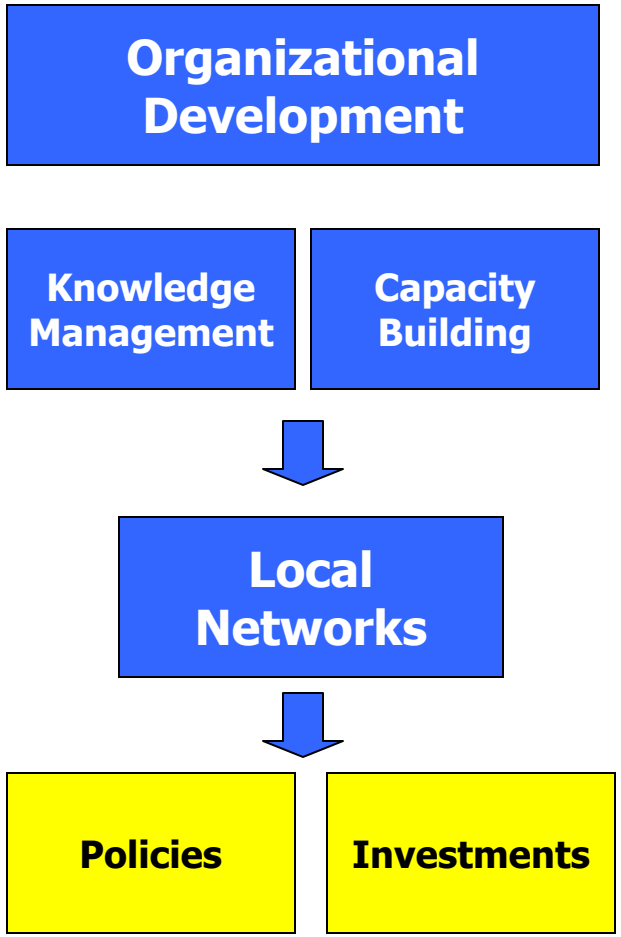
Local network	Year of Establishment	LN with separate legal identity	LN with dedicated secretariats	LN with private sector funding
PRC	2005	No	Yes	Yes
Indonesia	2002	Yes	Yes	Yes
Nepal	2005	No	Yes	No
Pakistan	2005	No	Yes	No
Philippines	2001	Yes	Yes	Yes
Sri Lanka	2001	Yes	Yes	Yes
Viet Nam	2001	Yes	Yes	No

Part 3: Short History and Main Components of CAI-Asia

CAI-Asia's Strategy

- Phase 1 (2001 – 2004): Awareness raising, knowledge management and influencing local action, scope for improvement in policy and implementation.

- Phase 2 (2005-2007): Two-pronged approach:
  - 1: Establishment and strengthening of local networks in the main countries and cities that are part of CAI-Asia
  - 2: Implementation focus-identification of investment opportunities and policy lobbying



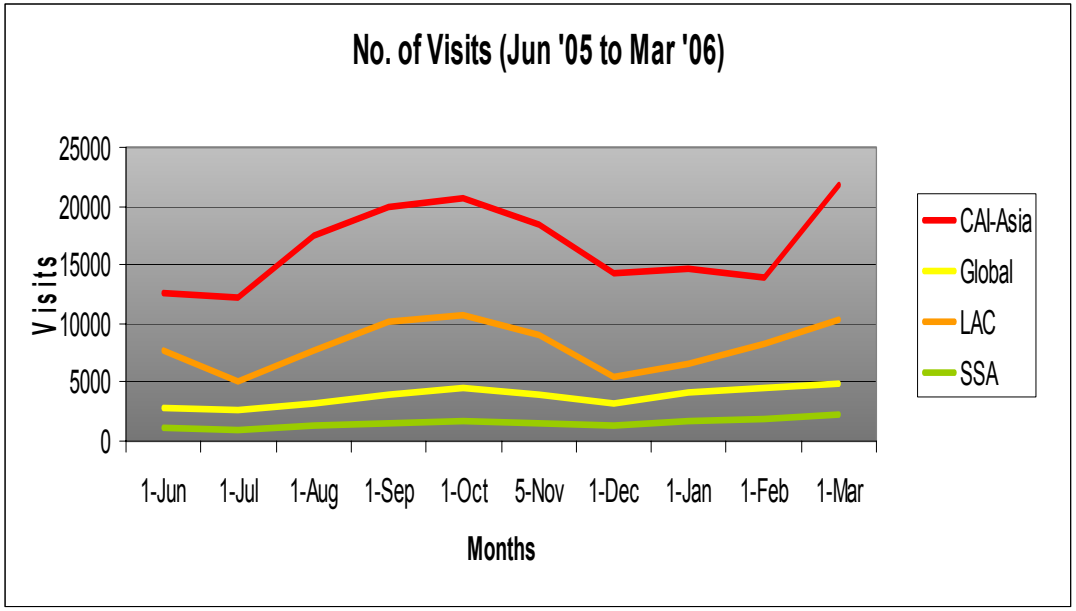
Mainstreaming AQM and SUT

- **Being Effective in improving air quality requires mainstreaming of AQM:**
  - Policies and Investments of developing *country governments and cities*
  - Mainstream Air Quality in *development agencies including ADB* by identifying Investment Opportunities on AQ related topics including Sustainable Urban Transport
  - Mainstreaming is best conducted by developing specific areas of expertise such as sustainable urban transport

- **Successful Mainstreaming requires a critical mass of awareness:**
  - Air Quality needs to be made "sexy"
  - Understanding of the importance of the problem and emphasizing the assurance of success
  - Target masses as well as specific target groups
  - Private sector is an essential ally
  - Link AQ message to other "supportive" messages such as climate change or road safety and promote co-benefit concept

Knowledge Management – CAI-Asia Website and Listserv

www.cleanairnet.org/caiasia



CAI-Asia website

- Website contains more than 3800 documents and counting …
- Receives on average more than 900 visitors per day

CAI-Asia listserv

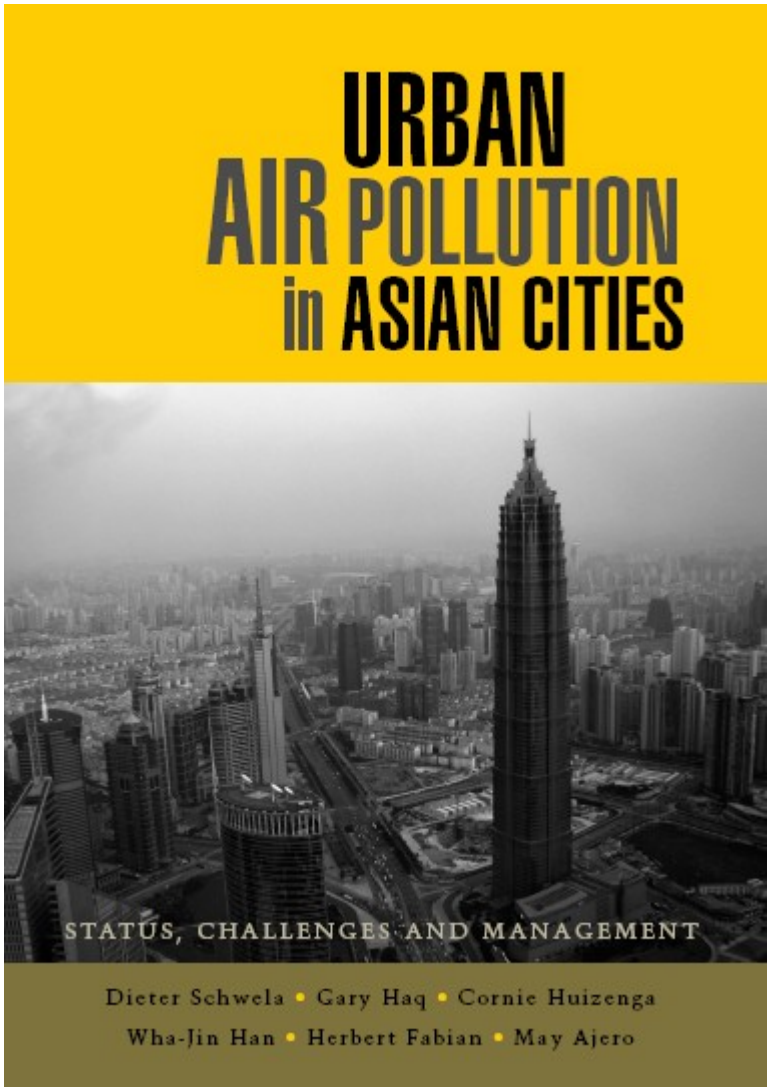
- The most active listserv on AQM in Asia
- More than 900 members
- More than 2700 posts since set up in 2002
- Country specific listservs for CAI-Asia local networks
- to join, visit http://cleanairnet.org/listserv

Knowledge Management Sample Products (1)

Health Effects of Outdoor Air Pollution

- First comprehensive overview of health impacts of air pollution in Asia
- CAI-Asia partnered with HEI, which is world leader in this field of research

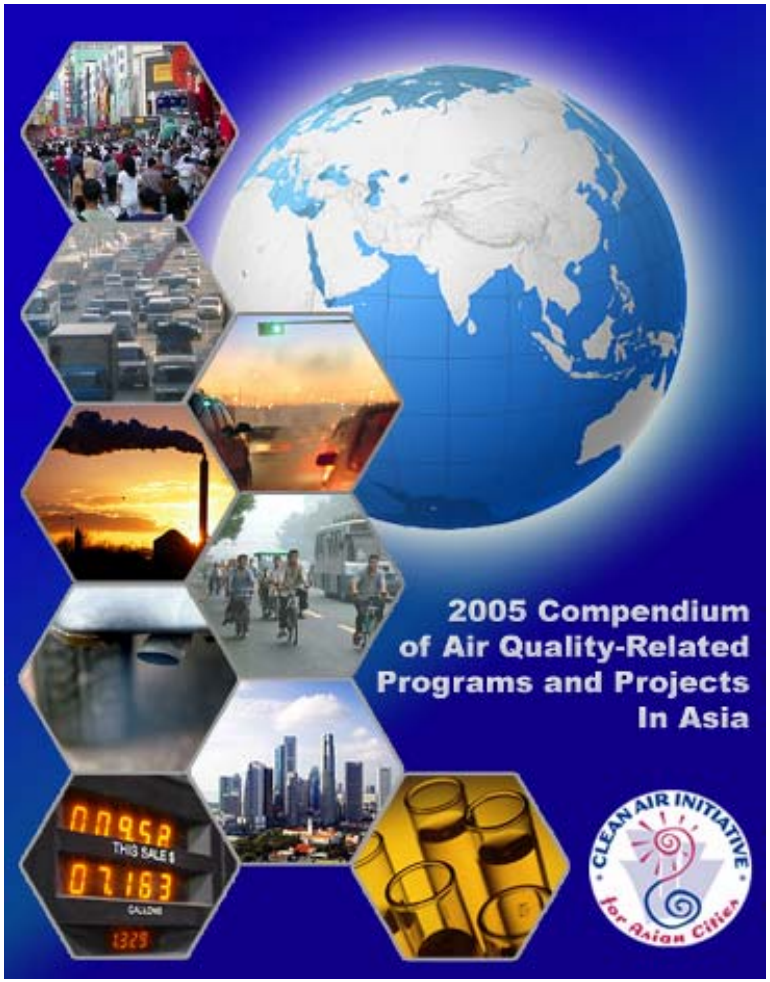
Knowledge Management Sample Products (2)



Benchmarking of Urban Air Quality Management Capabilities

- Based on study in 20 Asian cities
- Allows exchange on lessons learned in addressing air pollution issues

Knowledge Management Sample Products (3)

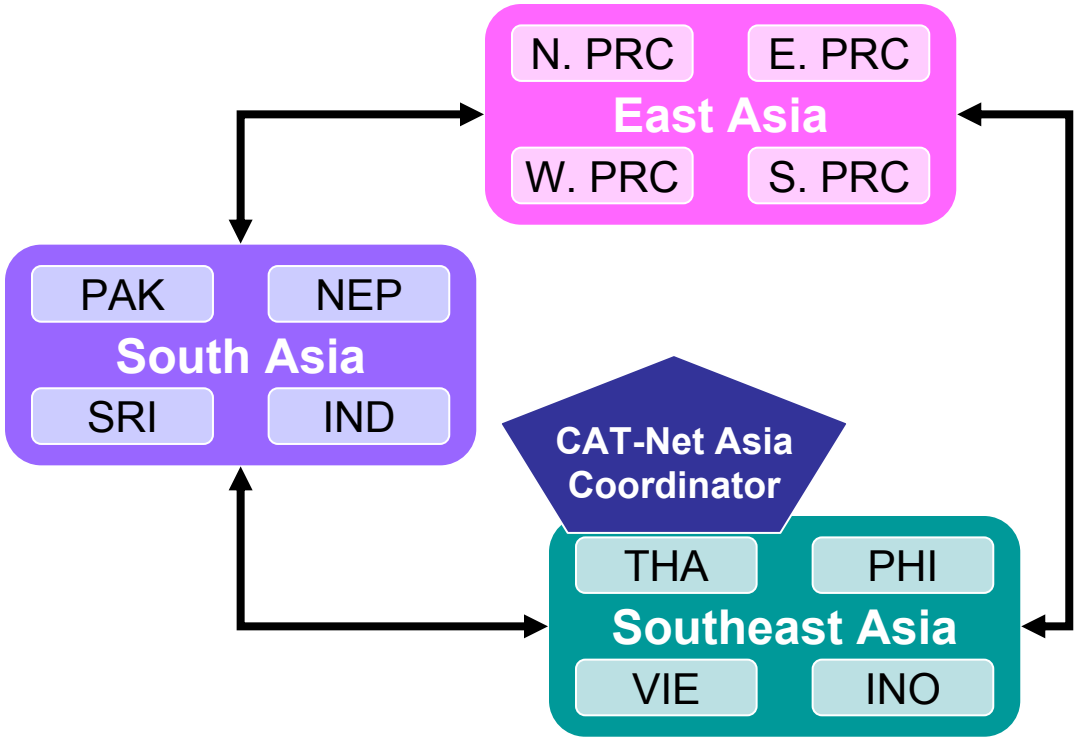


Compendium

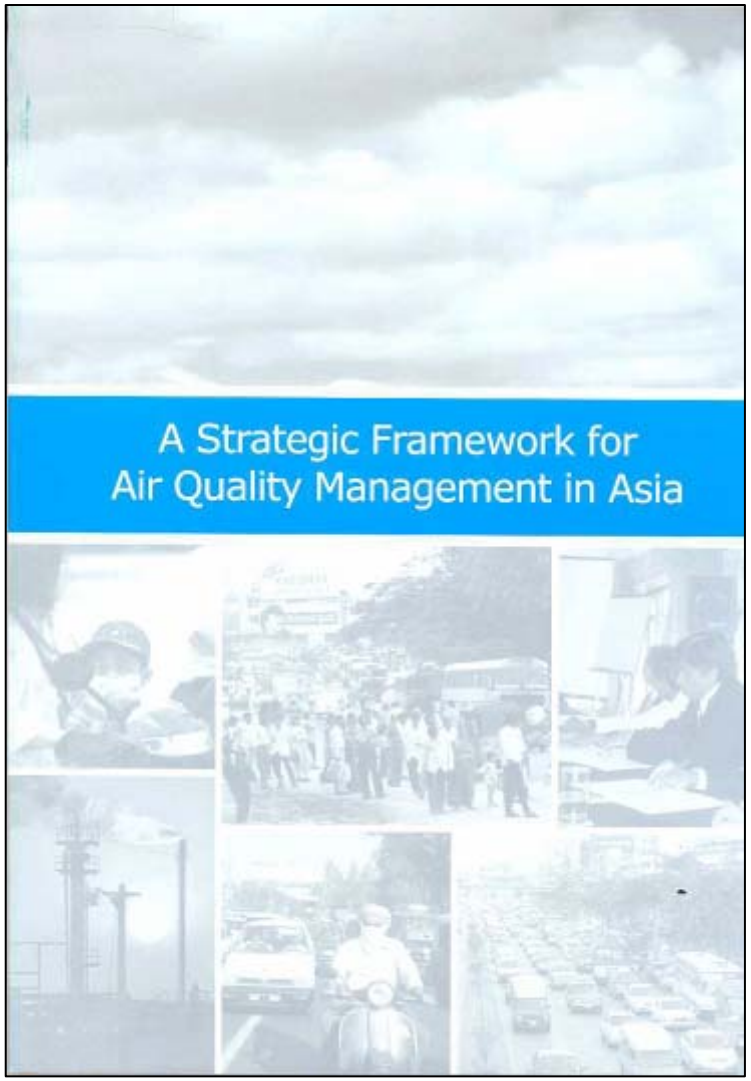
- Annual Report documenting all AQM program and projects in Asia
- Basis for annual CAI-Asia/UNEP donor coordination forum on AQM

Capacity Building – CATNet Asia

- Effective AQM that will make a difference in Asia will require a massive capacity building on AQM
- Current training programs will need to be improved in quantity and quality:
  - Get more training institutions involved
  - Develop more training courses
  - Train more trainers
  - Conduct more trainings
- Develop CATNet Asia as a separate program in CAI-Asia to enhance its sustainability and its impact



Policy Development (1)



Strategic Framework For Air Quality Management in Asia

- A high level document which guides decision makers in developing and implementing effective air quality management strategies
- Basis for training courses supported by CAI-Asia

Policy Development (2)

- CAI-Asia has created a series of policy forums in Asia to discuss urban air quality management and sustainable urban transport:
  - Annual Dialogue of Air Quality Initiatives (co-hosted with UNEP)
  - Governmental Meeting on Urban Air Quality (co-hosted with UNEP, MoE Indonesia, UNCRD)
  - Annual development partners meetings in CAI-Asia member countries (First quarter 2006)
  - Informal coordination of Emission factor development programs in Asia
  - Regional Forum on Environment and Health (CAI-Asia as AQ focal point) UNEP - WHO

New CAI-Asia Policy Initiatives

- CAI-Asia is considering to focus on 4 important policy initiatives in the near future:
  - Review and harmonization of ambient air quality standards
  - Adoption and harmonization of cleaner fuel quality standards
  - Promote Energy Efficiency in the Transport Sector including adoption of fuel economy standards
  - Promote co-benefits approach to urban air quality management and climate change mitigation

High Profile Pilot Programs

- CAI-Asia has initiated or supported pilot programs whereby implementation is carried out through member or partner organizations
  - Public Health and Air Pollution in Asia (PAPA) Program, implemented through Health Effects Institute
  - Impacts of urban air pollution on crop yields and growth rates in cooperation with Stockholm Environment Institute and Murdoch University (under development)
  - Partnership for Sustainable Urban Transport in Asia (PSUTA) implemented in cooperation with EMBARQ/WRI
  - Sustainable Urban Mobility in Asia (SUMA). In partnership with SUTP – GTZ, I-CE, EMBARQ, UNCRD-ES, and ITDP
- Pilot programs help to generate credibility, mobilize partners, identity policy scenarios and investment opportunities

Better Air Quality (BAQ) Workshops

BAQ workshops have had great impact on raising the profile of AQM in Asia. Since 2002 about 2,000 decision makers have participated in BAQ workshops. BAQ workshops have helped to shape policy processes in CAI-Asia member countries and cities.

http://baq2006.org

CAI-Asia Evaluation Phase 1

CAI Asia has been very effective in promoting understanding of AQ and bringing together various institutions / individuals to share information on AQ problems and solutions

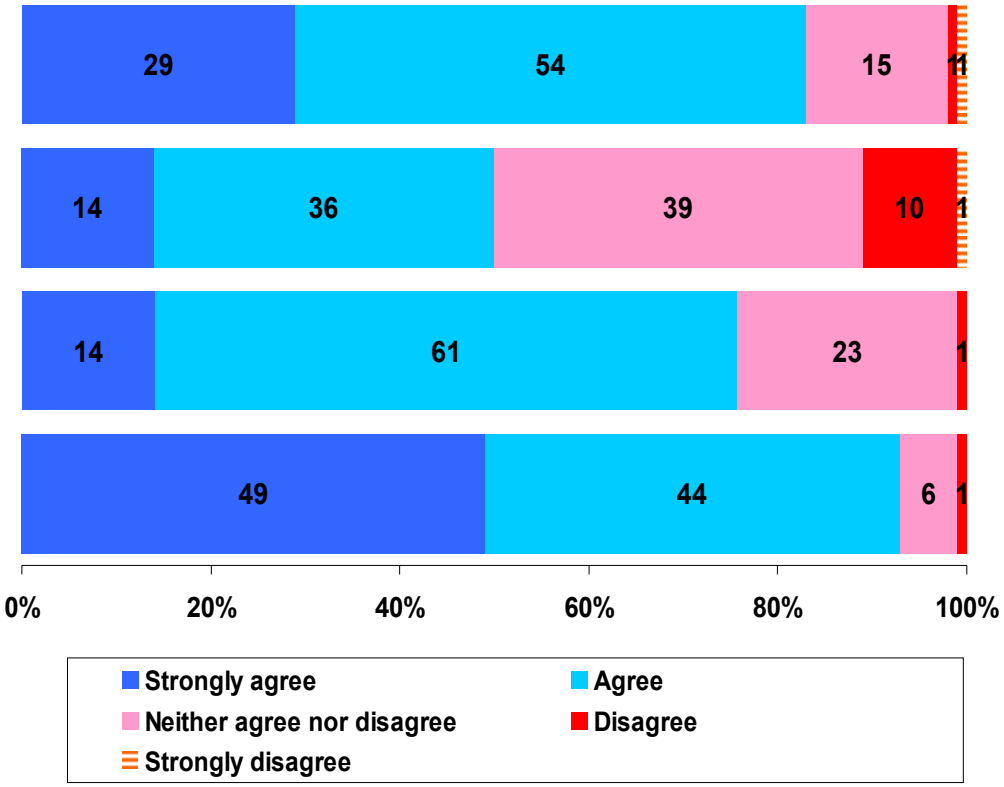
Moreover, it has also influenced cities / countries to undertake concrete AQM activities and to a lesser extent, contributed to the development of AQM policies

My participation in CAI-Asia activities helped improve personal understanding on AQ problems and solutions

CAI-Asia contributed to development of AQM policies in area/country

CAI-Asia activities resulted in more Asian cities/countries undertake concrete AQM activities

CAI-Asia successfully brought together various institutions/individuals to share information on AQ problems and solutions



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www.cleanairnet.org/caiasia

BAQ
Better Air Quality
2006
13 - 15 December
Yogyakarta
Indonesia

www.baq2006.org